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AUTHOR Mann, Monica
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ABSTRACT

For many schools in Hawaii and the Pacific, the increase of technology is a priority. A plan to improve instruction through the use of technology must be based on objectives pointing to improvement in student performance, rather than solely the acquisition of technology. The content of the curriculum needs to be developed first, with the best strategies and methods to improve teaching and learning considered later. Educators must examine why they are utilizing technology. Technology can be used for: accessing information, creating products and learning environments where teachers facilitate students' tackling of real problems, storing archives, and communicating through local and wide area networks. New technologies can help transform schools, but only if the technologies are used to support new models of teaching and learning. Distinct changes must occur in the classroom for technology to be integrated into instruction. These changes include: the switch from teacher-centered to student-centered activities; from whole class to small-group instruction; from structured to exploratory, open-ended learning; from competitive to cooperative work including group problem solving; and from classroom to whole-world interaction, using issues and case studies that require an interdisciplinary awareness and multiple resources. Issues and questions that decision-makers must consider include: how technology can be used to support existing goals, priorities, and direction; improve information management systems; change curriculum and instruction; change teacher and student roles; implications for equal access to technology and professional development; and the need to help teachers integrate technology into their instruction. (SWC)

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Technology in Education

by Monica Mann*

TO THE EDUCATIONAL RESOURCES
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“It's exciting! It's changing so rapidly! It's fast! Neat graphics!” people say as they are being “turned on” by the potential of modern technology. In the educational realm, it is being looked upon as a way to transform teaching, learning, assessing, and managing.

Introduction

Several states have developed new curriculum standards that encourage or require computer literacy as a basic skill. An increase in the research and improvement of technology programs is seen in the fiscal 1997 funding law that President Bill Clinton signed in September 1996. Educational technology programs will receive \$267 million, up from \$48 million last year. Most of the \$200 million increase is for a Technology Literacy Challenge Fund, which encourages volunteers to commit to share their expertise, to improve student capacity, and to make the Internet available in every U.S. classroom by the year 2000. President Clinton acknowledges that educational technology is one of his priorities and states that he believes teaching children computer literacy is “just as essential as teaching them to read and write.”

For many schools in Hawai'i and the Pacific, the increase of technology is a priority. It is also seen as a major goal in school improvement plans. The technology objective in these plans is often stated as “to purchase hardware and wiring necessary for the LAN (local area network).” Therefore, it may be important to point out that the purchase of equipment and supplies is not an adequate educational objective. Instead, a plan to improve instruction has to include objectives pointing to improvement in student performance with the use of technology. The content of the curriculum needs to be developed first and then the discussion will lead to the best strategies and methods to improve teaching and learning. Educators need to examine why they are utilizing technology. “What is the purpose, the goal?” is an important question. The second question may be: “How can technology enhance what is being done in the classroom?”

According to NCREL's “Plugging In,” “the only measure of the effectiveness of technologies and technology-enhanced educational programs is the extent to which they promote and support students' engaged learning and collaboration.”

*Note: Monica Mann is an educational specialist, Pacific Resources for Education and Learning(PREL), formerly the Pacific Region Educational Laboratory(PREL).

Technology can be used for the following areas:

- accessing information (through the Internet, videos, CD-ROMs, etc.)
- creating products and learning environments where teachers facilitate students' tackling of real problems (multimedia software makes presentations professional and fun)
- storing archives (large amounts of information can be stored in small amounts of space)
- communicating through LANs and WANs [wide area networks] is quick and affordable

Chris Dede, a futurist and expert on educational technology, said in an interview for *Educational Leadership*, that new technologies can help transform schools — but only if the technologies are used to support new models of teaching and learning.

"If technology is simply used to automate traditional models of teaching and learning, then it'll have very little impact on schools. If it's used to enable new models of teaching and learning, models that can't be implemented without technology, then I think it'll have a major impact on schools," says Dede.

The Challenge

Dede also states that schools are like any other organizations. The first impression of technology is that it will help do the same tasks faster. The challenge is to have educators examine their models of teaching and learning. The purpose of a good education is to help each person become more effective in life. Accessing information is a highlight of the new technologies, but the important question is: What happens after the information is gained? This first step of accessing expertise leads to investigations and inquiry and to the construction of knowledge. It can also generate knowledge, which changes a person's mental models and perspective of how one views things.

There are distinct changes that must occur in the classroom for technology to be integrated into instruction. These changes include:

- **Teacher-Centered to Student-Centered Activities**

Teachers need to move from the didactic mode of lecturing and directing to facilitating and coaching. The term being used is "moving from the sage on the stage to the guide on the side." The teacher can no longer be the fountain of knowledge because there is simply too much to know.

- **Whole Class to Small-Group Instruction**

Using technology will mean that teachers need to promote and organize small group activities more than whole class instruction. Groups of students will be able to work on different projects and at different paces.

- **Structured to Exploratory**

Computers, videotapes, and other technologies allow students to explore diverse worlds. These activities would need to be open-ended and flexible as there are possibilities which teachers cannot predict.

- **Competitive to Cooperative**

Teachers need to teach students to work in a different mode that requires cooperation and problem solving in small groups. Students can no longer be lost in a large class, but now will need to contribute to and participate in real-life tasks.

- **Classroom to Whole-World Interaction**

The context of "real-world" has been emphasized in teaching and is now made a reality through the use of technological resources. Issues and case studies using actual real-world problems are possibilities and require an interdisciplinary awareness and multiple resources.

Not only are there implications of how technology affects teaching and learning, but there are other concerns as well. Judson Hixson and Debra Beauprez of NCREL list several issues and questions that decision-makers must consider:

- How can technology be used to support existing goals, priorities, and direction?
Technology should not be the end in itself, but should lead to a greater goal. The next question becomes: "What new models or structures for organizing schools and instruction are now possible as a result of available technology?"
- How can technology improve information management and student information systems? How can this information be accessible to teachers in a timely and useful manner without becoming an additional burden? Information is critical to teachers and administrators as they make decisions about instruction, assessment, allocation of resources, and potential needs and priorities.
- How can technology be used to change curriculum and instruction, as well as the roles of both teachers and students?
With relatively little space and low costs, technology can provide access to a wealth of information resources that cannot be matched by local libraries and resource rooms. The quality and quantity of information through electronic texts, CD-ROMs, the Internet, and computer networks will change the roles of the teacher and the student. Students access the information and may be involved in an inquiry process which critically analyzes and uses the rapidly changing information. Ninth graders today are doing as much research via the computer as graduate students did 20 years ago. Teachers must become more comfortable using various information resources to monitor student performance and progress.
- What are the implications for equal access to existing and emerging technologies?
Technology may be seen as a tool for improving performance of low-achieving students. But making the resources available on a large scale is a costly solution. In an informal survey of Mathematics and Science specialists from the Pacific entities, it was found that cost is a major obstacle to obtaining more computers and the necessary supportive infrastructure. It is evident that some schools have more resources and can take greater advantage of the new technological capabilities. Departments should be aware and should not allow technology to widen the inequities. It should reform education as a whole.
- What are the implications for professional development?
Instead of professional development using the emerging technologies, the technology can be applied to the content of professional development itself. Preservice and inservice development can be enhanced by the use of technology. The possibilities are endless. Videotapes and video-conferencing may be used for networking, study groups, interactive courses, and access to educational resources and research. The technology can be used to automate, expedite, and organize the extensive informational resources available.
- There is a continuing need to help teachers integrate technology into their instruction. Most teachers use the computer, but few go beyond word-processing and graphics. Teachers are anxious about the use of computers in the classroom. This affects their motivation and ability to master computer skills. The anxiety must be addressed in order to change teachers' attitudes about the use of technology. According to a report by the Committee for Economic Development, 80% of math and science teachers say computers are important in instruction, but more than half report feeling unprepared to use them. Teachers are just beginning to increase the use of calculators in mathematics classes. Trainers need to not just teach teachers how to use computers, but also how to teach using an inquiry process with multi-media technology.

Conclusion

"Technology is changing nearly overnight; it is dynamic; it holds potential for all segments of society. The challenge before all of us is to use it as a means to move forward", says SERVE's publication *Technology Infrastructure in Schools*. The SERVE document is a useful reference for those that will be making decisions related to information technology.

"Techno is terrifying. Get used to it. It's here to stay," says Marc Hequet in an article in National Staff Development Council's *The Developer*. The fear of technology can motivate teachers to do something about it. "Learn that which can leverage what you want to do," says Hequet.

Once again, the message is that teachers need to know what they want to do, know the purpose, and know their goals before they even begin a project. As simple as it may seem, educators often undertake projects and launch them without clear purposes or targets. "We can't get there if we don't know where we're going."

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